



Richard Metcalf, one of INL's newest employees, is part of a generation of young nuclear engineers helping to turn the laboratory into an international leader.

Against All Odds: Young INL Engineer Rises to the Top

by [Ethan Huffman](#), INL Communications & Public Affairs

One of Idaho National Laboratory's newest nuclear engineers goes by Richard Royce Madison Metcalf. With a name like that, you might expect his ego to be just as large. But at 23, Metcalf is as humble and proficient as they come.

Although he's one of the lab's youngest employees, he comes to INL with a set of sharp skills and a passion for securing the nuclear fuel cycle. His story is not what you'd expect, but his enthusiasm for working at the lab makes him a rising star.

Metcalf spent most of his childhood in northern Texas, living in several towns near Fort Worth. The area, established in the late 1800s as a military post, has in the last few years succumbed to higher-than-average crime rates and an understaffed police force. Most of the homes he lived in had barred windows to prevent burglary and theft. As a teen, Metcalf, the son of a single working mother, routinely helped his family make important financial decisions and often repaired broken equipment around the house.

"I was raised in a family where we all had to contribute," Metcalf said. "So now I approach projects with an attitude that I can fix anything with enough effort."

Despite his difficult childhood, much of which is too personal to write about, Metcalf excelled in the classroom. At 15, he skipped the last two years of high school to study linguistics and sociology at the [University of North Texas](#). Under a unique university program called the [Texas Academy of Mathematics and Science](#), Metcalf and several young gifted students were allowed to pursue their bachelor's degrees at a much earlier age. In exchange for passing college-level courses, the students advanced closer to completing their degrees while also earning a high school diploma.

Metcalf's work in nuclear nonproliferation is helping develop security guidelines for future nuclear facilities and reactors.

After two years at UNT, the 17-year-old was on track to graduate college at an age when most students are just beginning. But following a series of conversations with his adviser in 2003, he began to question his course of study.

"I guess I had an epiphany moment," Metcalf said. "With a degree in sociology you really only have two career choices. You can become a counselor or a lawyer, and neither of those seemed right for me."

After reflecting on his future, he pondered pursuing nuclear engineering. As a sophomore, he had learned about nuclear science and found the material to be both interesting and complex. In fact, Metcalf said he didn't really understand nuclear technology, but saw potential in the science and was eager to learn more.

Becoming an Aggie

During the summer of 2004, Metcalf transferred to [Texas A&M University](#). But unlike his previous classroom experiences, he faced a new level of difficulty and sharp criticism at A&M.



Metcalf is working on a number of project

As a non-science transfer student, his first two semesters included 18 credits of coursework covering topics like modern physics, reactor theory and several applied engineering classes.

On one of his first exams, he scored a 63 percent. His professor was less than thrilled with his performance, and chided him in a handwritten note at the bottom of his exam. Metcalf, who swears he'll never forget the message, repeats the words as if it were yesterday - "Don't bother seeing me after class, you should probably just quit."

But he didn't quit. And during a semester where well over half the students dropped out, he continued to study and push through the difficult coursework. All this while working for the university as an audio-visual technician to help pay for tuition and books. His hard work earned him

for INL, including developing advanced safeguards guidelines for pyroprocessing facilities similar to the lab's Fuel Conditioning Facility. the respect of his professors, and by the end of the year, he finished his classes with a solid B average. Even more impressive, at graduation, Metcalf was one of only 15 students to earn a degree in nuclear engineering.

Conditioning Facility.

"Coming from a liberal arts program into the sciences was a difficult transition and I basically had to complete two years of schooling in the first year to catch up," says Metcalf. "But I didn't mind, because if you're not working hard to get somewhere, you won't get anywhere."

As Metcalf continued to pursue nuclear engineering, he worked on a variety of national security programs that eventually led him to INL.

One program, sponsored by the [Department of Homeland Security](#), paid Metcalf to collect open source information from Web sites, image databases and blogs to identify and categorize potential threats to the nation's critical infrastructures. In particular, he was assigned to look at dams and waterways within the state of New York. The concept was to collect information available in the public domain and send it to DHS, where a formal risk analysis would be performed.

By 2006, the multiyear initiative created an internship opportunity for him at [Los Alamos National Laboratory](#). Metcalf had planned to continue his analysis work for DHS, but the day he arrived in New Mexico, the program's federal funding was cut, and he was forced to work on a different project. Ironically, that change sparked Metcalf's interest in nonproliferation.

"Rather than send me home, LANL had me work on a project dealing with nuclear terrorism," said Metcalf. "Even though I wasn't as busy as I wanted to be, the project furthered my interest in safeguards and security."

Post grad

That fall, Metcalf returned to Texas A&M to pursue his master's degree in nuclear engineering. He decided to focus on nonproliferation safeguards, or the development of policies, technology and diplomacy that limit the spread of illicit nuclear materials.

It was during those classes that he first learned about INL.

One of his professors and a longtime friend, Dr. Paul Nelson, mentioned he had spent the summer learning about a comprehensive nuclear safeguards simulation project called SEASAME. Nelson suggested Metcalf apply to intern at INL so he could participate on the project as a student researcher. SEASAME, originally an INL laboratory-directed research and development project, was an ambitious program that aimed to use virtual reality and modeling to demonstrate how advanced technology and policy could improve overall security at nuclear facilities.

In 2007, INL hired Metcalf as an intern to assist Dr. Robert Bean with conducting a competitive analysis on SEASAME. While working on the project, he also co-authored a series of white papers and proposals for the [Department of Energy's Office of Nuclear Energy](#) and the [National Nuclear Security Administration \(NNSA\)](#). His proposals explored new methods for improving the real-time detection of errant nuclear materials. His ambition impressed advisers at INL and at NNSA, who funded one of his proposals and provided enough money for INL to employ Metcalf part-time while he finished his thesis.



A look inside the Fuel Conditioning Facility at the INL's Materials and Fuels Complex.

"Richard was a great intern," said Bean. "When we would have discussions, he provided valid input, and if we had a problem to solve, he was the first to volunteer to help."

A bright future

By the end of 2008, Metcalf had completed his coursework and – after defending his thesis in February on methods for reducing proliferation concerns in fast reactors – was awarded his master's degree. Almost immediately, INL put him to work on several projects that focused both on research and recruiting like-minded engineers.

Today, Metcalf is working on a variety of projects, from optimizing safeguards approaches for pebble reactors to analyzing security at pyroprocessing facilities. And while he manages these initiatives, he's also working to recruit the next generation of nuclear engineers to Idaho. In March, he recruited eight of the top nuclear and science students from the likes of [Purdue University](#), the [Monterey Institute of International Studies](#) and his alma mater, Texas A&M, to spend this summer interning within INL's National and Homeland Security Directorate.

Never one to slow down, Metcalf plans to continue his relationship with INL when he returns to Texas A&M this fall to pursue both his doctorate degree and a certificate in homeland security policy.

"The INL has given me a real opportunity, a chance to do something important," said Metcalf. "I have to produce to keep these opportunities available for me and for others to come."

And by the sounds of his former adviser and now colleague Bean, Metcalf appears to be on the right track.

"He's a very driven individual," said Bean. "And if he comes back to INL with his Ph.D., I only hope he'll let me work for him."

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